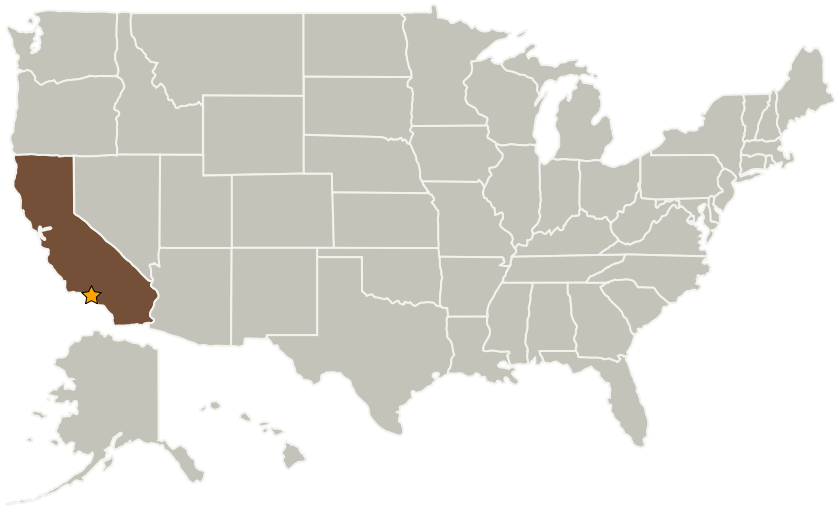
Reconfigurable GPS/MEMS IMU/WAAS/RA Navigation System for UAVs, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

Accurate absolute position, velocity, attitude and precise relative navigation are critical capabilities for unmanned air vehicles (UAVs) to improve their autonomy and reduce the mission life-cycle cost. This Phase I project investigates a low cost, miniature reconfigurable autonomous navigation system for all flight missions of the UAV. The proposed approach employs a flexible Federated Kalman filtering architecture and an onboard knowledge-based expert system to integrate a MEMS IMU, a multi-antenna GPS receiver, a Wide Area Augmentation System (WAAS) receiver, a data link receiver for DGPS corrections, and a radar altimeter. The configured integrated GPS/MEMS IMU system presents a high degree of navigation performance for UAV?s flight phases, release, cruise, approaching, and landing. The configured multi-antenna GPS interferometer/MEMS IMU integration provides a navigation solution for the UAV?s cruise operations, while the configured GPS/WAAS/MEMS IMU/Radar Altimeter integration provides precise approach and landing capabilities for the UAV. An intelligent neural network is applied to perform multi-sensor failure detection and isolation, and redundancy management. AGNC commercial products and AGNC US patents providing advanced integration technologies for MEMS IMU, GPS, WAAS, and radar altimeter will insure a successful project.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
American GNC Corporation	Supporting Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Simi Valley, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Ching-fang Lin

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.5 GN&C Systems Engineering Technologies
    - TX17.5.2 GN&C Fault Management / Fault Tolerance / Autonomy